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**US 5751549 A**    **US 4917572 A**    **US 3829250 A**

(58) Field of Search

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(54) Abstract Title

**Cabinet for units which dissipate heat**

(57) A cabinet 2 is disclosed for a plurality of units 6 which dissipate heat. The cabinet 2 has a plenum chamber 12, a rack 4 for mounting the units allowing passages for cooling air past the units, and a fan unit 14 for propelling air to flow from outside the cabinet through the passages into the plenum chamber and through an exhaust from the plenum chamber. The fan unit has a backwardly curved impeller 16 mounted for driven rotation about an axis and an outlet passage 20 arranged to direct out-flowing air generally parallel to the axis.

The fan unit 14 may be mounted in the top of the cabinet so as to direct out-flowing air upwardly. The cabinet 2 may have a passage containing a filter through which the air is drawn into the cabinet 2.

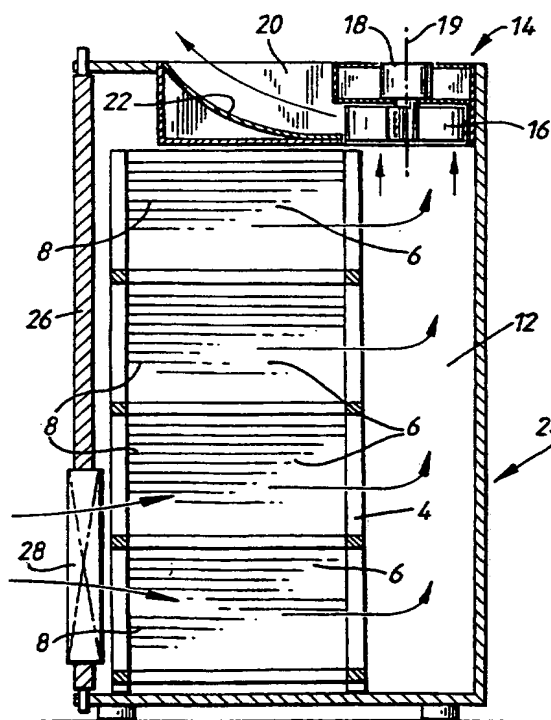


Fig. 1

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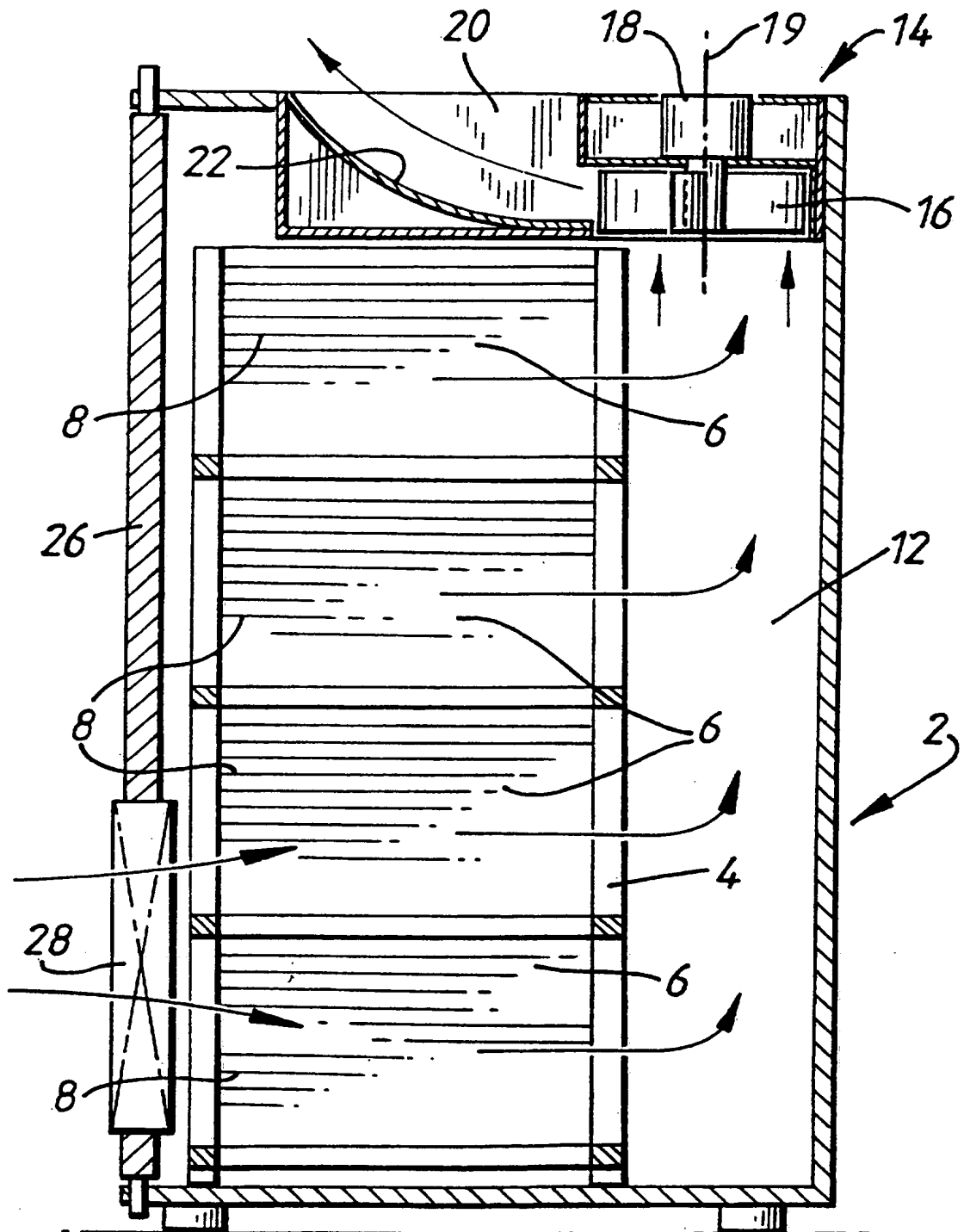


Fig. 1

Fig. 2

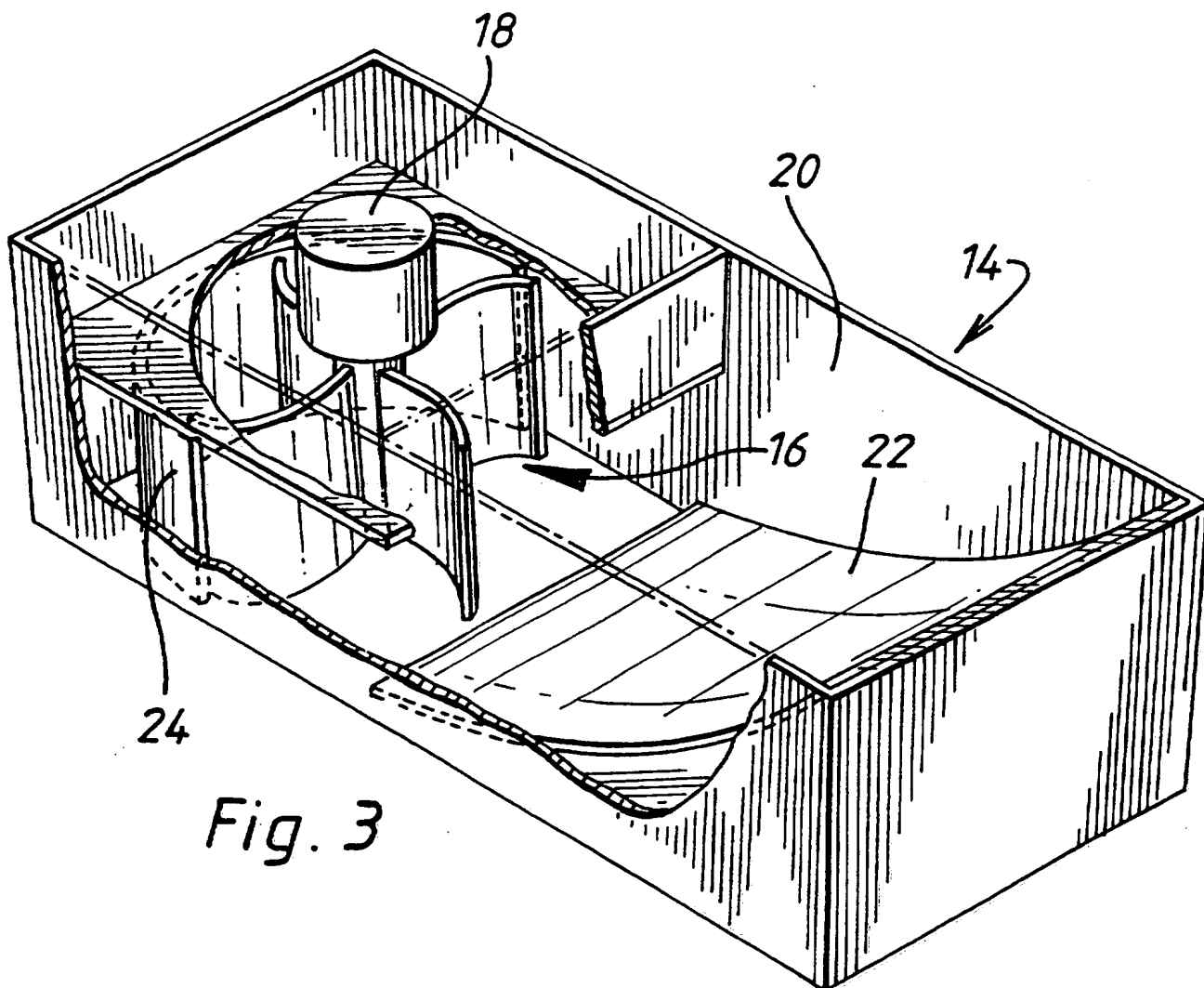
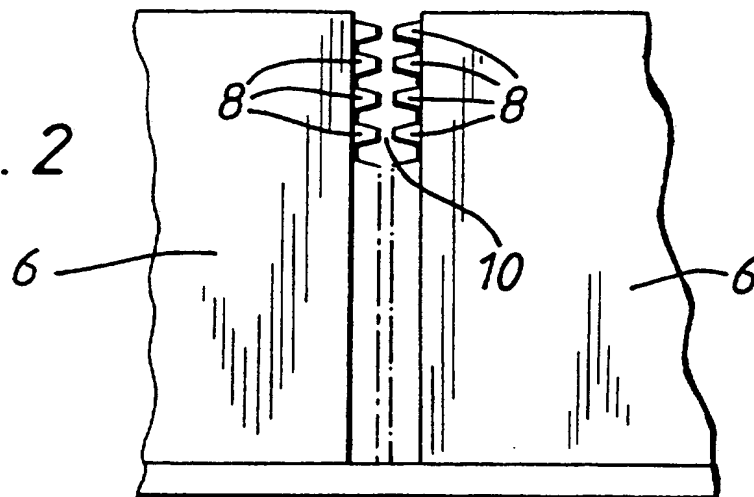


Fig. 3

## CABINET FOR UNITS WHICH DISSIPATE HEAT

This invention relates to cabinets for units which dissipate heat.

The background to the invention will be described with reference to a particular application. The invention is not limited to this application and others will occur readily to  
5 the reader.

Electronic equipment is often manufactured in units intended to be mounted in racks. Each unit dissipates heat and may require cooling. One method of cooling is to provide each unit with its own cooling fan. The invention is based on a proposal to construct the rack as a cabinet and to draw air into the cabinet over all the units so  
10 cooling them all together. Designing a cabinet uncovers a conflict. The cabinet has to be dimensioned to fit existing equipment rooms, i.e. its dimensions are desired to be conventional. In the cabinet it is desired to place as many units as possible, so they will be as close together as possible commensurate with leaving passages for cooling air to circulate between them. Narrower passages also lead to higher air speed which  
15 improves cooling. However, narrower passages also lead to greater resistance to air flow and thus to larger fans which reduces the amount of interior space available for the units.

Against this background, there is provided a cabinet for a plurality of units which dissipate heat, the cabinet having a plenum chamber, means for mounting the units  
20 allowing passages for cooling air past the units, and a fan unit for propelling air to flow from outside the cabinet through the passages into the plenum chamber and through an exhaust from the plenum chamber, said fan unit having a backwardly curved impeller mounted for driven rotation about an axis and an outlet passage arranged to direct out-  
flowing air generally parallel to the axis. The provision of a fan unit having backwardly a  
25 curved impeller, dramatically increases the potential working pressure difference across a fan unit of given dimensions, compared with an axial fan, which allows maximum internal space to be allocated to the heat dissipating units.

Preferably, the fan unit is mounted in the top of the cabinet so as to direct out-flowing air upwardly.

The invention has even greater advantage when, as in a preferred embodiment, air is drawn into the cabinet through a filter, since this increases the resistance to flow and  
5 thus the load on the fan unit.

In a preferred arrangement, the cabinet has a door in which the passage is located and the plenum chamber is located behind the units remote from the door.

One embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

10 Figure 1 is a schematic cross section of a cabinet embodying the invention;

Figure 2 is a scrap front view of two units contained by the cabinets, showing an air passage between them; and

Figure 3 is a pictorial view of the fan unit with its cover removed.

Referring to the drawings, the cabinet 2 has an internal rack 4 for electronic units  
15 6, e.g. radio units, antenna coupling equipment, power distribution equipment, central processing electronics etc. The units are mounted side by side in the rack as illustrated in Figure 2. The units 6 dissipate heat and some or all have extended external surfaces, or fins, 8 to assist cooling as air circulates through narrow passages 10 between them.

Behind the rack 4 is a plenum chamber 12 at the upper end of which a fan unit 14  
20 is located. In order to remain desirably small whilst being able to draw sufficient air through the narrow passages 10, the fan unit has a backwardly curved impeller 16 which is driven by an electric motor 18 to rotate about an axis 19. From the nature of a backwardly curved impellor, air is drawn axially into the impeller from the plenum chamber 12 and is driven radially outwardly by the rotating impeller. It is desired that the  
25 exhaust air should flow generally upwardly parallel to the axis 19 and to this end the fan unit has an outlet passage 20 defined by a baffle 22 which deflects air generally

vertically. A further baffle 24 deflects outwardly flowing air forwardly towards the outlet passage 20.

The cabinet is closed and sealed by a door 26 so that the only inlet for air into it is through a filter, shown schematically at 28, mounted in the door. This further restricts  
5 the airflow increasing the load on the fan unit and making the need for the backwardly curved impeller greater.

## CLAIMS

1. A cabinet for a plurality of units which dissipate heat, the cabinet having a plenum chamber, means for mounting the units allowing passages for cooling air past the units, and a fan unit for propelling air to flow from outside the cabinet through the  
5 passages into the plenum chamber and through an exhaust from the plenum chamber, said fan unit having a backwardly curved impeller mounted for driven rotation about an axis and an outlet passage arranged to direct out-flowing air generally parallel to the axis.
2. A cabinet as claimed in claim 1, wherein the fan unit is mounted in the top  
10 of the cabinet so as to direct out-flowing air upwardly.
3. A cabinet as claimed in claim 1 or 2, including a passage containing a filter through which the air is drawn into the cabinet.
4. A cabinet as claimed in claim 3, wherein the cabinet has a door in which the passage is located and the plenum chamber is located behind the units remote from  
15 the door.